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Mr. John Grantham
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Department of Ecology
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FLUOR DANIEL, INC.

Date: September 2, 1992

Reference: Hanford Waste Vitrification Plant
DOE Contract DE-AC06-86RL10838
Fluor Contract 8457

Transmittal No.: WDOE-208

Dear Mr. Grantham:

TRANSMITTAL

We enclose * copy of the items listed below. These are issued per US-DOE request.
*5 Specifications

Response due to Fluor: N/A
Responds to: P27A PKG

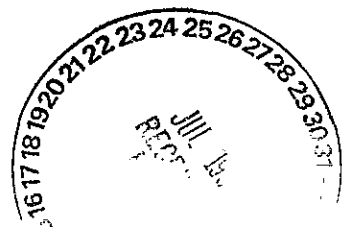
NUMBER	Rev.	Date	TITLE
SEE TRANSMITTAL ATTACHMENT	-----		P27A PACKAGE MOTOR CONTROL CENTER
			NOTE: FOR AFC ISSUE ONLY. NO RFC SIGNATURE PAGE TO BE ISSUED.

Distribution:

Reference: FRP-544, FUP-223
R. L. Long: DOE-RL, w/0
VPO/AME Corresp Cntrl Cntr, MSIN A5-10
(P27A PKG), w/0
P. Felise, WHC-RL (MSIN G6-16), w/1 Spec
Environmental Data Management Center
(MSIN H4-44), w/1 Spec
D. Duncan, US EPA, Region X, w/0

Very truly yours,

Rosalie Cadenas for
R. S. Poulter
Project Director



MHF
RSP:MHF:lt

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PAGE 1
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TRANSMITTAL ATTACHMENT FOR PACKAGE SPECIFICATIONS

PACKAGE NUMBER	SPECIFICATION NUMBER	PACKAGE REVISION	SECTION REVISION	PACKAGE TITLE	SECTION	SECTION TITLE
P27A	B-595-P-27A	0		MOTOR CONTROL CENTER		
P27A			0		01730	OPERATION AND MAINTENANCE DATA
P27A			0		16482	MOTOR CONTROL CENTER

MOTOR CONTROL CENTER
B-595-P-27A

29559

SPECIFICATIONS

HANFORD WASTE VITRIFICATION PLANT

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE



FLUOR DANIEL
ADVANCED TECHNOLOGY DIVISION
CONTRACT 8457

DOE CONTRACT NO.
DE-AC06-86RL10838

9413155 0988

MOTOR CONTROL CENTER
B-595-P-27A

"APPROVED FOR CONSTRUCTION"

REVISION NO. 0
ISSUE DATE 9-2-92

WAPA YES NO. X
SAFETY CLASS 3

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MOTOR CONTROL CENTER

DIVISION 1 - GENERAL REQUIREMENTS

REVISION. NO.

Section	Title	
01730	Operation and Maintenance Data	0

DIVISION 16 - ELECTRICAL

Section	Title	
16482	Motor Control Center	0

SECTION 01730
*OPERATION AND MAINTENANCE DATA
(B-595-P-27A-01730)

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SECTION 01730
OPERATION AND MAINTENANCE DATA

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SECTION 01730 OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit operation and maintenance (O&M) data which is specifically applicable to this contract and a complete and concise depiction of the provided equipment or product. Data containing extraneous information to be sorted through to find applicable instructions will not be accepted. Present information in sufficient detail to clearly explain user O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.1.1 Package Content

For each product, system, or piece of equipment requiring submission of O&M data, submit the package required in the individual technical section. Package content shall be as required in the Paragraph 1.3, "Schedule of Operations and Maintenance Data Packages."

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include requirements to set up and prepare each system for use.

1.2.1.3 Start-Up, Shutdown, and Post-Shutdown Procedures

Include a control sequence for each of these operations.

1.2.1.4 Normal Operations

Include control diagrams with data to explain operation and control of systems and specific equipment.

1.2.1.5 Emergency Operations

Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

1.2.1.7 Environmental Conditions

Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.

1.2.2.1 Lubrication Data

Include lubrication data, other than instructions for lubrication in accordance with Paragraph 1.2.1.6, Operator Service Requirements.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis.

1.2.3 Corrective Maintenance

Include manufacturer's recommendations on procedures and instructions for correcting problems and making repairs.

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and list tools required to restore product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays.

1.2.3.6 Corrective Maintenance Man-Hours

Include manufacturer's projection of corrective maintenance man-hours. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

1.2.4 Appendices

Provide information specified in the preceding paragraphs pertinent to the maintenance or operation of the product or equipment. Include the following:

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1.2.4.1 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

- A. Manufacturer's Standard Commercial Practice: The parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice.
- B. Other Than Manufacturer's Standard Commercial Practice (MSCP): End item manufacturer may add a cross-reference to implement components' assemblies and parts requirements when implementation in manual form varies significantly from the style, format, and method of manufacturer's standard commercial practice. Use the format in the following example:

End Item Manufacturer's Alphanumeric Sequence	Actual Manufacturer's Name and MSCP	Actual Manufacturer Part No.
100001	John Doe & Co. 00000	2000002

1.2.4.2 Warranty Information

List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

1.2.4.3 Personnel Training Requirements

Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

1.2.4.4 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.3.1 Data Package

- A. Operating instructions
- B. Safety precautions
- C. Operation prestart
- D. Start-up, shutdown, and post shutdown
- E. Normal operations
- F. Emergency operations
- G. Operator Service Requirements
- H. Environmental conditions
- I. Preventative maintenance
- J. Lubrication data
- K. Preventive maintenance plan and schedule
- L. Corrective maintenance
- M. Troubleshooting guides and diagnostic techniques
- N. Wiring diagrams and control diagrams
- O. Maintenance and repair procedures and manhour requirements
- P. Removal and replacement instructions
- Q. Spare parts and supply list
- R. Parts identification
- S. Warranty information
- T. Personnel training requirements
- U. Testing equipment and special tool information

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PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION

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SECTION 16482
MOTOR CONTROL CENTERS
(B-595-P-P27A-16482)

"APPROVED FOR CONSTRUCTION"

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ISSUE DATE 9-2-92

WAPA YES NO. X
SAFETY CLASS 3

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SECTION 16482
MOTOR CONTROL CENTERS

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ATTACHMENTS

<u>ATTACHMENT</u>	<u>TITLE</u>	<u>REV. NO.</u>
ATTACHMENT A	MCC COMPONENTS LIST	0
ATTACHMENT B	STARTER DIAGRAMS	0

SECTION 16482
MOTOR CONTROL CENTERS

PART 1 GENERAL

1.1 SUMMARY

- 1.1.1 This specification describes the technical requirements for the design, fabrication, inspection, testing, and delivery of free-standing Motor Control Centers (MCC).
- 1.1.2 This specification supplements Attachments A and B on which specific requirements are listed in detail. Whenever there is a conflict between this specification and the attachments, the latter shall govern.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA AB 1	1986 Molded Case Circuit Breakers and Molded Case Switches
NEMA ICS 2	1988 Industrial Control Devices, Controllers and Assemblies
NEMA ICS 4	1983 Terminal Blocks for Industrial Use
NEMA ICS 6	1988 Enclosures for Industrial Control and Systems (Rev. 1 - 1989)
NEMA 250	1985 Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	1990 National Electrical Code (NEC)
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UNDERWRITERS LABORATORIES, INC. (UL)

UL 489	1986 Molded-Case Circuit Breakers and Circuit Breaker Enclosures
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UL 845 1988 Standard for Safety Motor Control Centers

UL 508 1989 Industrial Control Equipment Fifteenth Edition, October 19, 1990

UL 1059 1988 Terminal Blocks

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

1.4 DEFINITIONS

(Not Used)

1.5 SYSTEM DESCRIPTION

Motor control centers shall be a part of 480/277 V ac, 3 phase, 4 wire, 60 Hz, grounded distribution system for the Hanford Waste Vitrification Plant (HWVP).

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Data Sheets and Shop Drawings

1.6.1.1 Dimensional plan and front elevation of each motor control center.

1.6.1.2 Conduit entrance locations and dimensions for both top and bottom entries to MCCs.

1.6.1.3 Detail drawings, as required, showing mounting details. A section view including wiring trough location dimensions, assembly of starter unit demonstrating accessibility of equipment and terminals.

1.6.1.4 Bolted connection between shipping sections to be installed during field assembly.

1.6.1.5 Neutral and ground bus connections.

1.6.1.6 Weight of equipment for each shipping section.

1.6.1.7 Elementary diagrams of individual cubicle units, including terminal numbers.

1.6.1.8 Nameplate drawings.

- 1.6.1.9 Connection diagrams of individual cubicle units and MCC space heaters.
- 1.6.2 Material List
Material list shall be furnished for each motor control center listing the quantity, type, rating and manufacturer's catalog number of all equipment in each unit.
- 1.6.3 Spare Parts List
A list of manufacturer's recommended spare parts for start-up and one (1) year's operation. Include sufficient data to permit procurement from the original manufacturer or any subsupplier.
- 1.6.4 Installation, Operating, and Maintenance manuals shall be in accordance with Specification Section 01730 and shall include:
 - 1.6.4.1 Storage, installation, operating, and maintenance instructions shall cover all the equipment furnished including procedure for field connections between shipping sections and bolt torquing values.
 - 1.6.4.2 Operating and maintenance instructions shall include technical data on motor starters, auxiliary relays, contactors, overload relay selection table and time-current curves of each different molded case circuit breaker.
- 1.6.5 Shop Inspection and Testing Reports
Inspection and certified test reports in accordance with Paragraph 2.2.
- 1.6.6 Detailed factory acceptance test procedures for the tests specified under Paragraph 2.2.3.
- 1.6.7 Recommended field acceptance test procedures.
- 1.6.8 Rating Certification
Seller shall provide certification that equipment is rated for continuous operation in the environmental conditions defined in this specification.
- 1.6.9 Underwriters Laboratories Listing
A copy of the UL listing card showing compliance with applicable UL standards as listed in this specification.

1.7 CLASSIFICATION OF SYSTEM AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

1.8.2 Operating Environment

A. Indoor Temperature 65°F to 104°F

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

2.1.1.1 The motor control centers shall consist of one or more manufacturers' standard prefabricated vertical sections comprising individual control units arranged to provide a completely dead-front totally enclosed assembly.

2.1.1.2 The motor control centers shall be NEMA Class 1, Type B wiring per NEMA ICS2, Part ICS2-322. MCC cubicles shall be equipped as noted on Attachments A and B. All equipment shall be fabricated of new materials.

2.1.1.3 Where applicable, materials and components within motor control centers shall be listed by Underwriters Laboratories and bear the UL label.

2.1.1.4 Internal components shall be securely anchored to their containing cubicle by self-tapping screws.

2.1.1.5 When two or more components of the same specifications are required, the components shall be identical, i.e. same manufacturer and catalog number.

2.1.2 Enclosures

- 2.1.2.1 Outside joints shall present a smooth finish. The vertical sections shall be minimum of 20 inches deep. MCC shall be arranged for front mounting and front maintenance.
- 2.1.2.2 When starter or breaker "Spaces" are indicated on Attachment A, they shall be supplied complete with guide rails, plug-in connections, and blank cover plates ready for installation of starter or breaker units with a minimum amount of field labor.
- 2.1.2.3 The enclosure shall be NEMA type 1 gasketed per NEMA Standard 250 and constructed in a manner that will permit end to end placement against similar control centers with no interferences because of bolts, nuts, and cover plates. The enclosure, including supporting frame structure and surface sheet metal thickness, shall conform to NEMA ICS 6 and UL 845. The starter NEMA sizes and/or circuit breakers ratings for each motor control center cubicle shall be as shown on Attachment A.
- 2.1.2.4 MCC incoming line compartment shall be arranged for conduit entry from the bottom. The cable lugs shall be installed at the top portion of the compartment for terminating incoming cables entering from below. Minimum distance from the bottom of the MCC to the centerline of the cable lugs shall be 3'-0".
- 2.1.2.4.1 Main incoming supply cables shall enter MC-32A-205 in the extreme right vertical section when viewed from the front of the assembly.
- 2.1.2.4.2 Main incoming supply cables shall enter MC-32B-205 in the extreme left vertical section when viewed from the front of the assembly.
- 2.1.2.4.3 Maximum overall space requirements for MCC assembly MC-32A-205 shall be 100 inches wide, 20 inches deep and 90 inches high.
- 2.1.2.4.4 Maximum overall space requirement for MCC assembly MC-32B-205 shall be 80 inches wide, 20 inches deep and 90 inches high.
- 2.1.2.5 A clear opening at the incoming line section shall be provided for the entrance of conduits. The minimum dimensions for this opening shall be 13-1/2 inches front to back and 17-1/2 inches side to side. The opening shall be centered on the floor plan of the vertical section.
- 2.1.2.6 MCC sections shall be arranged for all outgoing feeder cables exiting the MCC from the top.
- 2.1.2.7 The base of each vertical section shall be reinforced with provisions made for welding each corner of each vertical section

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base to the Buyer's embed channels with 3/16 inch fillet welds, minimum 3 inches long.

- 2.1.2.8 Barriers or baffles shall be provided to prevent an arc from leaving the compartment in which it originates and in any way damaging devices, wiring, or other equipment outside the compartment.
- 2.1.2.9 The structure and bus arrangement of the MCC shall be such that it can be expanded on both ends.
- 2.1.3 Bus Structure
- 2.1.3.1 Each MCC vertical section shall contain a three phase vertical bus with minimum rating as shown on Attachment A. Seller shall determine if higher bus rating is required by starter rating and arrangement. For the incoming line section, vertical bus shall be same rating as the horizontal bus.
- 2.1.3.2 The main bus shall be rated as shown on Attachment A. The maximum temperature of motor control center phase bus bars shall be 50°C rise over maximum ambient per Paragraph 1.8 at full load and rated voltage. The specified bus rated currents are exclusive of any derating factors required by applicable codes and standards, NEMA ICS 2, and UL 845. Phase, neutral and ground buses shall be copper.
- 2.1.3.3 Phase buses and the neutral bus shall be insulated from the enclosing structure and braced for short circuit values shown on Attachment A. Bus support insulators shall be flame retardant, non-arc tracking, with mechanical and dielectric strength to withstand the stresses of the indicated fault current. The use of padding material between insulators and bus is not acceptable.
- 2.1.3.4 Copper bus bar connections shall be equivalent to a minimum overlap of a full bus bar width. The entire overlap surface of each joint shall be silver plated. Points of connection for control units and disconnecting devices shall be silver plated.
- 2.1.3.5 There shall be a minimum clearance in air of 1 inch between phases and between phase and ground. The buses shall be arranged to provide a phasing of A-B-C, left to right, front to back, top to bottom, when viewed from the front of the motor control center. All buses shall be accessible from the front of the assembly.
- 2.1.3.6 The main bus shall be drilled and provided with crimp-type two-hole, long barrel copper terminals for incoming power cables sizes as indicated on Attachment A.

- 2.1.3.7 The motor control center shall have a 300A capacity copper neutral bus extending the entire length of the structure. Bus shall be provided with crimp-type two-hole, long barrel copper terminals for incoming neutral cables as indicated on Attachment A.
- 2.1.3.8 Each motor control center shall have a 1/4-inch by 1-inch copper bar ground bus extending the entire length of the structure and shall have quantity and size of crimp-type copper terminals at incoming end as indicated on Attachment A. Bus shall be provided with crimp-type copper terminals for individual ground cables as indicated on Attachment A.
- 2.1.4 Wireway
- 2.1.4.1 Each vertical section shall be provided with wireway at the top and bottom. Top wireway shall be located forward from the bus and shall be separated from it by means of a removable barrier. Minimum of 12 inches height shall be provided for outgoing cables at the top.
- 2.1.4.2 Full height vertical wiring channels shall be provided for power and control wiring. Vertical wiring channels shall be free of the live parts and shall be covered by its own door.
- 2.1.4.3 The horizontal wireways shall be enclosed by screw cover panels.
- 2.1.5 Motor Starters
- 2.1.5.1 Motor starters shall be full voltage non-reversing (FVNR). Each combination starter shall be housed in an individual compartment and in accordance with UL 508. The units shall be readily removable from the front by disconnecting the necessary control and load leads. It shall be possible to remove any unit without opening adjacent compartment doors, disconnecting adjacent equipment or in any manner disturbing the operation of any other unit in the control center. Each unit shall have devices to assure accurate mechanical alignment both horizontally and vertically. Units requiring the same size compartments shall be interchangeable. The assembly shall permit rearrangement of the units at a later date, such as replacing three single units with a single unit requiring three spaces, without cutting or welding.
- 2.1.5.2 Devices in the removable units shall be accessible from the front. Devices shall be mounted to permit normal maintenance and replacement of components of one compartment without interference with other compartments. No wiring except connections to stabs shall be located on the back of the removable units.

- 2.1.5.3 Doors shall be provided with an interlocking feature to prevent the opening of any door when the unit it houses is energized. The doors shall be provided with a defeater mechanism to permit authorized personnel to unlatch and open the door while the operating lever is in the "On" position. Operating handles shall clearly indicate the "On" and "Off" positions of the circuit breakers.
- 2.1.5.4 Power contacts shall open and close all phases simultaneously. Minimum starter size shall be NEMA size 1.
- 2.1.5.5 Each starter shall have the quantity of auxiliary contacts indicated on Attachment B. The contacts shall be rated heavy duty in accordance with NEMA ICS 2. All auxiliary contacts, except those used to perform functions within the removable unit, shall be wired to the terminal boards in accordance with Attachment B.
- 2.1.6 Circuit Breakers
- 2.1.6.1 Circuit breakers shall be enclosed in a phenolic or similar nonconducting case and in accordance with NEMA AB 1 and UL 489. Circuit breakers shall be rated for 65 KA interrupting rating with trip rating as shown on Attachment A.
- 2.1.6.2 Circuit breakers shall be operated by a toggle mechanism of the quick-make, quick-break type and shall be entirely trip free. Each breaker shall open all phases and shall trip all poles simultaneously. All breakers not part of a combination starter shall be equipped with thermal magnetic trip units. Breakers shall have 150 amp minimum frame size and be rated 600 volts.
- 2.1.6.3 Provide means for padlocking circuit breakers with at least one padlock in the "ON" position and three padlocks in the "OFF" position, with the door closed.
- 2.1.6.4 Combination starters shall have motor circuit protector (MCP) type circuit breakers through NEMA Size 5 with multiple trip settings, minimum of five settings.
- 2.1.7 Overload Relays
- 2.1.7.1 Bimetallic, eutectic alloy overload elements or adjustable current sensing solid state trip devices shall be provided for all phase conductors. Eutectic alloy elements shall be of thin film type construction. It shall be possible to reset the overload relays without opening the compartment doors. Overload relay elements shall be provided on all phase conductors. Overload relays shall be ambient-compensated and based on table 430-150 of NFPA 70, the National Electrical Code.

- 2.1.7.2 The overload trip setting shall be adjustable by minimum of $\pm 15\%$ of the respective rating and shall be sized for 100% of motor full load currents with 1.15 motor service factor.
- 2.1.7.3 Each overload relay shall consist of three current sensing elements with one common contact.
- 2.1.8 Relays
- 2.1.8.1 Relays, when required, shall have 120 V ac 60 Hz rated coils and interchangeable contacts rated for 10 amps continuous at 120 V ac. Westinghouse Type AR or equal.
- 2.1.9 Control Transformers
- 2.1.9.1 Control transformers shall be 480-120 volts and shall be mounted on the removable unit with no wiring behind the unit. One side of the secondary winding shall be fused, and the other side of the secondary shall be grounded. Transformers shall have both primary windings fused.
- 2.1.9.2 Control transformers shall be connected to alternate phases of control center power buses to provide balancing of single phase loads. Control transformers shall be one standard size larger than is required for control devices shown on Attachment B.
- 2.1.10 Fuses
- Fuse clips shall have contact surface and spring tension to prevent heating or loosening of the fuses after continued operation or repeated removal and replacement.
- 2.1.11 Ammeters
- Ammeters shall be provided at the MCC as shown on Attachment A. Ammeters shall be panelboard type with scale range to match current transformer ratios shown on Attachment A. Ammeters shall have 2% accuracy. Ammeter dial shall be white background with black markings mounted on the associated compartment door.
- 2.1.12 Current Transformers (CT)
- CT's shall be provided with ratios as indicated on Attachment A. The CT's shall be window type installed in the combination starter unit. CT burden shall not be less than the instruments it is connected to.

2.1.13 Instrument Transducers (IT)

Transducers shall be supplied as indicated on Attachments A and B. Current transducers shall have 5 amp full scale input and 4-20 mA output. Transducer shall be self-sustaining type with no requirement for auxiliary voltage source. Transducer shall be mounted inside the removable unit.

2.1.14 Pilot Devices

All pilot devices mounted in the motor control centers such as pushbuttons, selector switches and other such items shall be single unit construction heavy duty with contact arrangements as shown on Attachment B. Contacts shall be rated for minimum of 10 amps. "Start" pushbuttons shall have momentary contacts and "stop/pull reset" pushbutton shall have maintained contacts.

2.1.15 Terminal Blocks

Pull-apart type terminal blocks shall be provided and numbered as shown on Attachment B and shall be mounted at an accessible location. Terminal blocks shall have 20 percent spare terminals but not less than two points per each terminal block. All terminal blocks shall be clearly marked for control wiring connections, and shall be sufficiently removed or isolated from the buses to provide safe wiring separation with the buses energized. Terminal blocks shall be 600 volt molded barrier type with binding screws and with white marking strip. Terminal blocks shall be in accordance with NEMA ICS4 and UL 1059. Current transformers circuit terminal blocks shall be shorting type.

2.1.16 Connections to Bus

Bus to line-side connections of removable units for NEMA starter sizes up to and including Size 4 shall be stab type clips with silver plated contact surfaces. They shall make contact automatically upon inserting the unit and disconnect automatically upon removal of the unit. The stab assembly shall be separable from other components of the removable unit. The stab assembly shall be constructed so that line-to-line and line-to-ground short circuits will not be possible when a unit is being inserted or removed.

2.1.17 Wiring

2.1.17.1 Wiring between devices and terminal blocks shall be bundled, supported by straps and installed in a neat and tidy manner. Wiring shall not be festooned. Control wiring in the motor starter units shall be stranded copper conductors not less than #14 AWG. Power and current transformer wiring shall be #12 AWG

minimum with flame retardant 600 volt, UL listed type RHH or THHN and 90°C minimum insulation in accordance with NFPA 70.

- 2.1.17.2 Control wiring shall be identified at each termination point utilizing embossed PVC sleeve type wire markers. Stick-on labels are not acceptable.
- 2.1.17.3 Terminations shall use locking spade connectors such as Thomas and Betts "Sta-Kon or equal."
- 2.1.17.4 Unit connection diagrams shall be permanently attached inside of each unit door before shipping.
- 2.1.18 Space Heaters
- Each vertical section of MCC shall contain thermostatically controlled 120 volt ac fused space heater to prevent moisture condensation. Space heaters shall be rated at 240 volt ac but shall operate at 120 volt for longer life. All heaters within each assembly shall be controlled by one single-pole circuit breaker located in the assembly. The entire circuit shall be wired to an accessible terminal block providing for a single connection of the external power source. Each space heater shall be easily accessible from the front of each unit.
- 2.1.19 Nameplates
- 2.1.19.1 Nameplates shall be furnished for the motor control center assembly, for each cubicle and for each starter component, as shown on Attachment A. The assembly nameplates shall be attached at the top front of the middle vertical section, and the unit nameplates shall be located on the front covers of the appropriate compartments. Attachment of nameplate shall be by means of self tapping screws. Rivets or sheet metal screws are not acceptable.
- 2.1.19.2 The nameplates shall be engraved phenolic. Phenolic nameplates shall be engraved to show black letters on white background. All cubicle nameplate lettering shall be a minimum of 3/16-inch high. Assembly nameplate lettering shall be a minimum of 3/4-inch high.
- 2.1.20 Finish
- 2.1.20.1 Parts to be painted shall have sharp edges broken and burrs removed and shall be thoroughly cleaned of rust, slag, oil, grease, or other foreign material. Steel parts not plated or galvanized, and all outside metal surfaces shall be painted with Seller's standard prime and finish paint.

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2.2 FABRICATION AND MANUFACTURE

2.2.1 General

2.2.1.1 Seller shall provide a certified shop inspection and test report demonstrating equipment conformance to the requirements of this specification.

2.2.2 Inspection

2.2.2.1 The equipment may be inspected at the factory by the Buyer's representative to assure compliance with the specifications, standards, and codes and any additional requirements listed in this specification and Attachments A and B.

2.2.2.2 Inspection by the Buyer and the manufacturer shall include, but not necessarily be limited to, the following items:

2.2.2.2.1 Assembly arrangement and dimensions for conformance with approved manufacturer's drawings.

2.2.2.2.2 Bus material, dimensions, ratings, insulation, phasing, short circuit bracing, silver or tin plating at joints and connections.

2.2.2.2.3 Ground bus material, sizes, continuity, ground lugs.

2.2.2.2.4 Nameplate type and color, contents, letter size, arrangement, mounting method.

2.2.2.2.5 Doors alignment, closing and latching.

2.2.2.2.6 Starter components, selector switches, pushbuttons, ammeters, transducers and terminal blocks.

2.2.2.2.7 Circuit breakers type, instantaneous or thermal-magnetic, current, voltage and short circuit ratings and padlocking provisions.

2.2.2.2.8 Contactors sizes, coil voltage ratings, number of auxiliary contacts, number of overloads.

2.2.2.2.9 Overload relays model and type, coil ratings, heater catalog numbers.

2.2.2.2.10 Control power transformer VA ratings, ratios, fuses.

2.2.2.2.11 Current transformers ratios, connections, voltage ratings.

2.2.2.2.12 Load terminals cable lug sizes.

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- 2.2.2.2.13 Terminal block type, wire connections, terminal block markings, clearance for field wiring.
- 2.2.2.2.14 Auxiliary relays model, type, coil voltage ratings, pick-up and dropout characteristics, number and rating of contacts.
- 2.2.3 Testing
 - 2.2.3.1 Testing shall be conducted and reported in accordance with NEMA Standards ICS 2, Part 322 and UL 845 and the procedures submitted by Seller.
 - 2.2.3.2 The tests shall include, but not necessarily be limited to, the following items:
 - 2.2.3.2.1 Insulation tests of all equipment, wiring and buses.
 - 2.2.3.2.2 Circuit continuity and wiring.
 - 2.2.3.2.3 Mechanical equipment adjustment and operation of all movable equipment and devices.
 - 2.2.3.2.4 Demonstration that drawout equipment of same rating and voltage is completely interchangeable.
 - 2.2.3.2.5 Electrical contact adjustments.
 - 2.2.3.2.6 Integrity of all electrical connections with respect to continuity and mechanical tightness.
 - 2.2.3.2.7 Correct operation of relays, energized at rated voltage and/or current.
 - 2.2.4 Delivery
 - 2.2.4.1 Provisions for Handling and Field Erection
 - 2.2.4.1.1 Each shipping section of the stationary structures shall be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.
 - 2.2.4.1.2 Each shipping section shall be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.
 - 2.2.4.1.3 Seller shall supply standard matching color paint for field "touch-up" after installation of the equipment.

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2.2.4.2 Shipping

2.2.4.2.1 Relays, current transformers, contactors and any other components having parts which may be damaged in transit, shall be securely blocked and braced to prevent damage during shipment.

2.2.4.2.2 Each shipping section shall be provided with a permanently attached, readily visible identification tag bearing the equipment number of the MCC assembly of which it is a part.

2.2.4.3 Preparation for Shipment

Preparation for shipment shall be in accordance with Seller's standards. The Buyer reserves the right to inspect and approve the equipment packaging prior to shipment.

PART 3 EXECUTION

(Not Used)

END OF SECTION

MCC Components List

Motor Control Center MC-32A-205
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65ka
Vertical Bus - 300A, Minimum

Incoming Lugs - 2 - 500 KCMIL per Phase and Neutral
- 2 - #1 AWG Ground

Specification No. B-595-C-P27A-16482
Data Sheet No. P27A-DS-1
Revision No. 0

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING.	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NEMA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
MC-32A-205	480 VOLT MCC	CANISTER STORAGE BLDG.														
480/277 VOLT	MAIN INCOMING LINE		600A													
AH-051-112	OPERATING AREA	EVAP. COOLER UNIT FAN BL-051-112	15 HP	21A	2	FVHR	C	40:5		#10	#10	II-CSS-037A-1	IT-CSS-037-1	HS-CSS-037A-1	HS-CSS-037B-1	HS-CSS-037C-1
AH-051-111	OFFICE AREA AHU FAN	BL-051-111	3 HP	4.8A	1	FVHR	D			#12	#12			HS-CSS-007A	HS-CSS-007B	HS-CSS-007C
VP-620-003VA	HEALTH PROTECTION SYSTEM	VACUUM BLOWER	7.5 HP	11A	1	FVHR	C	25:5		#12	#12	II-VAX-022-1A	IT-VAX-022-1	HS-VAX-022A-1	HS-VAX-022B-1	HS-VAX-022C-1
CU-051-111	OFFICE AREA	CONDENSING UNIT	9.4 KW	16.6A					20A	#12	#12					
EH-051-115	OFFICE AREA	ELECTRIC HEATER	2.5 KW	3.6A					20A	#12	#12					
EH-051-117	OFFICE AREA	ELECTRIC HEATER	7.5 KW	9.5A					20A	#12	#12					
UH-051-119	MECH. EQUIPMENT ROOM	UNIT HEATER	15 KW	19A					30A	#10	#10					
UH-051-121	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-123	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-125	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-127	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-129	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-131	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					

* See Note 1 on Page 4

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MCC Components List

Motor Control Center MC-32A-205
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65kA
Vertical Bus - 300A, Minimum

Incoming Lugs - 2 - 500 kCMIL per Phase and Neutral
- 2 - #1 AWG Ground

Specification No. B-595-C-P27A-16482
Data Sheet No. P27A-DS-1
Revision No. 0

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			WEMA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
UH-051-133	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
DO-180-001	STORAGE DOOR	ASSEMBLY	2.2 KW	4.8A					20A	#12	#12					
LX-32A-215	LIGHTING PANEL "A"	480/277V	100A	30A					100A	# 2	#8					
WELDING	RECEPTACLE #1	EQUIPMENT ROOM	60A	45A					60A	# 4	#10					
SPARE STARTER					2	FVNR	C	40:5		#10	#10					
SPARE STARTER					1	FVNR	C	25:5		#10	#10					
SPARE STARTER					1	FVNR	D			#10	#10					
SPARE	CIRCUIT BREAKER								30A	#10	#10					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
FUTURE STARTER	SPACE				2											
FUTURE STARTER	SPACE				1											
FUTURE STARTER	SPACE				1											
FUTURE 150 AF	CIRCUIT BREAKER	SPACE														
FUTURE 150 AF	CIRCUIT BREAKER	SPACE														
FUTURE 150 AF	CIRCUIT BREAKER	SPACE														

* See Note 1 on Page 4

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MCC Components List

Motor Control Center KC-32B-205
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65ka
Vertical Bus - 300A, Minimum

Incoming Lugs - 2 - 500 kCHIL per Phase and Neutral
- 2 - #1 AWG Ground

Specification No. B-595-C-P27A-16482
Data Sheet No. P27A-DS-1
Revision No. 0

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NEMA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REHOTE
KC-32B-205	480 VOLT MCC	CANISTER STORAGE BLDG.														
480/277 VOLT	MAIN INCOMING LINE		600A													
AK-051-113	OPERATION AREA	EVAP. COOLER UNIT FAN BL-051-113	15 HP	21A	2	FVNR	C	40:5		#10	#10	11-CSS-037A-2	11-CSS-037-2	HS-CSS-037A-2	HS-CSS-037B-2	HS-CSS-037C-2
VP-620-003VB	HEALTH PROTECTION SYSTEM	VACUUM BLOWER	7.5 HP	11A	1	FVNR	C	25:5		#12	#12	11-VAX-022-2A	11-VAX-022-2	HS-VAX-022A-2	HS-VAX-022B-2	HS-VAX-022C-2
EK-051-116	ELECTRIC EQUIPMENT ROOM	ELECTRIC HEATER	4 KW	3.6A					20A	#12	#12					
UH-051-118	MECH. EQUIPMENT ROOM	UNIT HEATER	15 KW	19A					30A	#10	#10					
UH-051-120	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-122	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-124	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-126	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-128	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-130	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UH-051-132	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
XT-32B-005	DISTR. PANEL "B" DA-32B-005	TRANSFORMER XT-32B-005	30 KVA	36A					60A	#4	#10					

* See Note 1 on Page 4

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MCC Components List

Motor Control Center MC-32B-205
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65kA
Vertical Bus - 300A, Minimum

Incoming Lugs - 2 - 500 kCMIL per Phase and Neutral
- 2 - #1 AWG Ground

Specification No. B-595-C-P27A-16482
Data Sheet No. P27A-DS-1
Revision No. 0

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NEKA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
LS-510-001	SEWAGE LIFT STATION		10.3KW	15.2A					30A	#10	#10					
WELDING	RECEPTACLE #2		60A	45A					60A	#4	#10					
SPARE STARTER					2	FVNR	C	40:5		#10	#10					
SPARE STARTER					1	FVNR	C	25:5		#10	#10					
SPARE STARTER					1	FVNR	D			#10	#10					
SPARE	CIRCUIT BREAKER								30A	#10	#10					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
FUTURE STARTER	SPACE				2											
FUTURE STARTER	SPACE				1											
FUTURE STARTER	SPACE				1											
FUTURE 150 AF	BREAKER	SPACE														
FUTURE 150 AF	BREAKER	SPACE														
FUTURE 150 AF	BREAKER	SPACE														

NOTE: 1. Starter Component Nameplates shall include the function ("Ammeter", "Stop/Pull Reset", etc.) and ID No.
as shown in the table (II-CSS-037A-1, HS-CSS-037A-1, etc.)
EXAMPLE: "AMMETER or "STOP/PULL RESET
II-CSS-037A-1" HS-CSS-037A-1"

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P27B1/dt

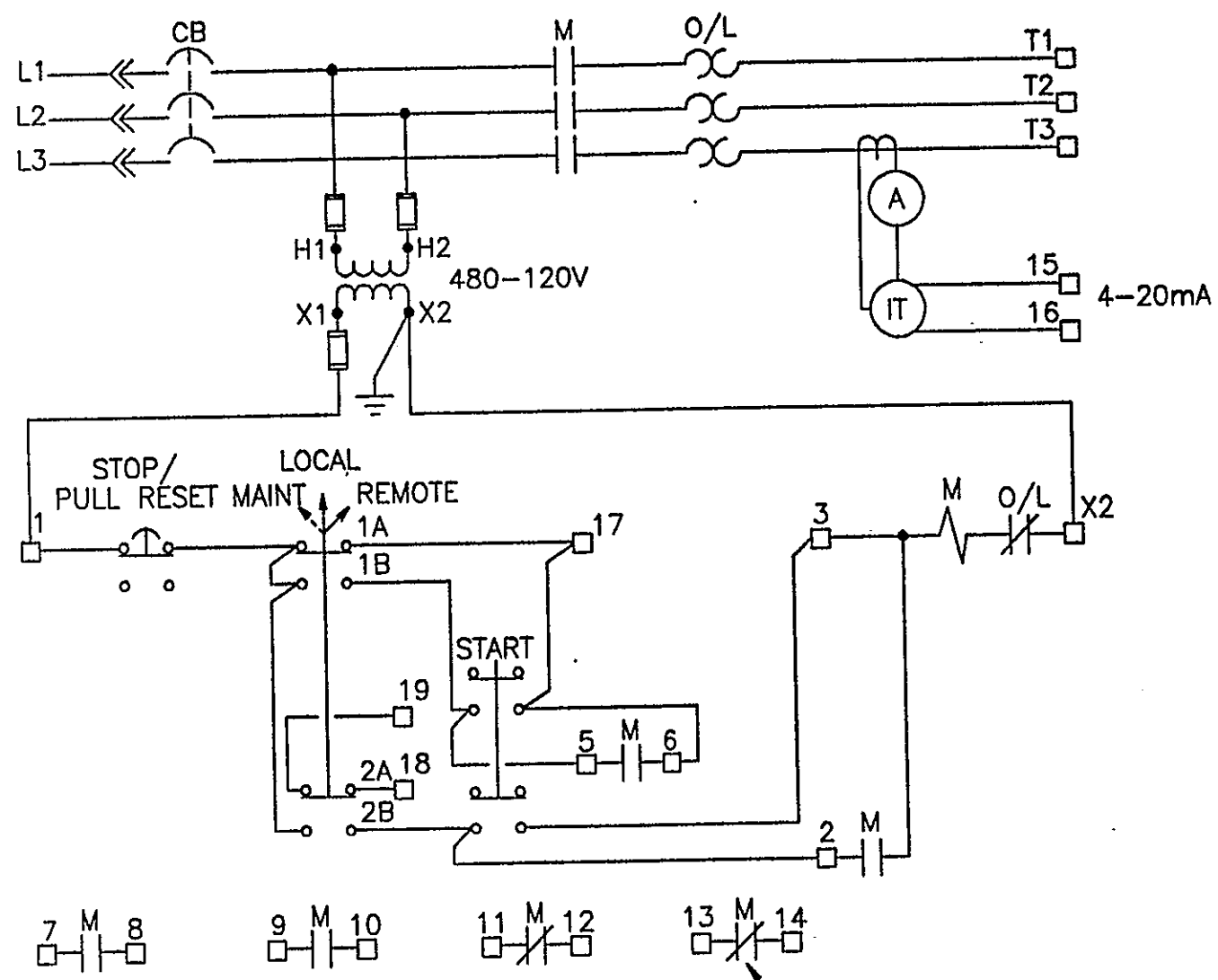
9413155.1018

99/3/55.1009

FLUOR DANIEL
DATA SHEET

U. S. Department of Energy
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838
STARTER DIAGRAM "C" FVNR, SIZE 1-4

NO.	BY	DATE	REVISION	SHEET NO.	REV
1				P27A-DS-2	0
2				DATE-92	CONTRACT
3				ITEM NO. N/A	845734
4				SECTION 16482	
5				MCC NUMBER	
6				ORIG BY	CHK'D
7				CCS	AT
8				APPR'D	



FOR SELECTOR SWITCH FUNCTION SEE TABLE 1, PAGE 3.

AUXILIARY CONTACTS (TYP)

□ - TERMINAL BLOCK

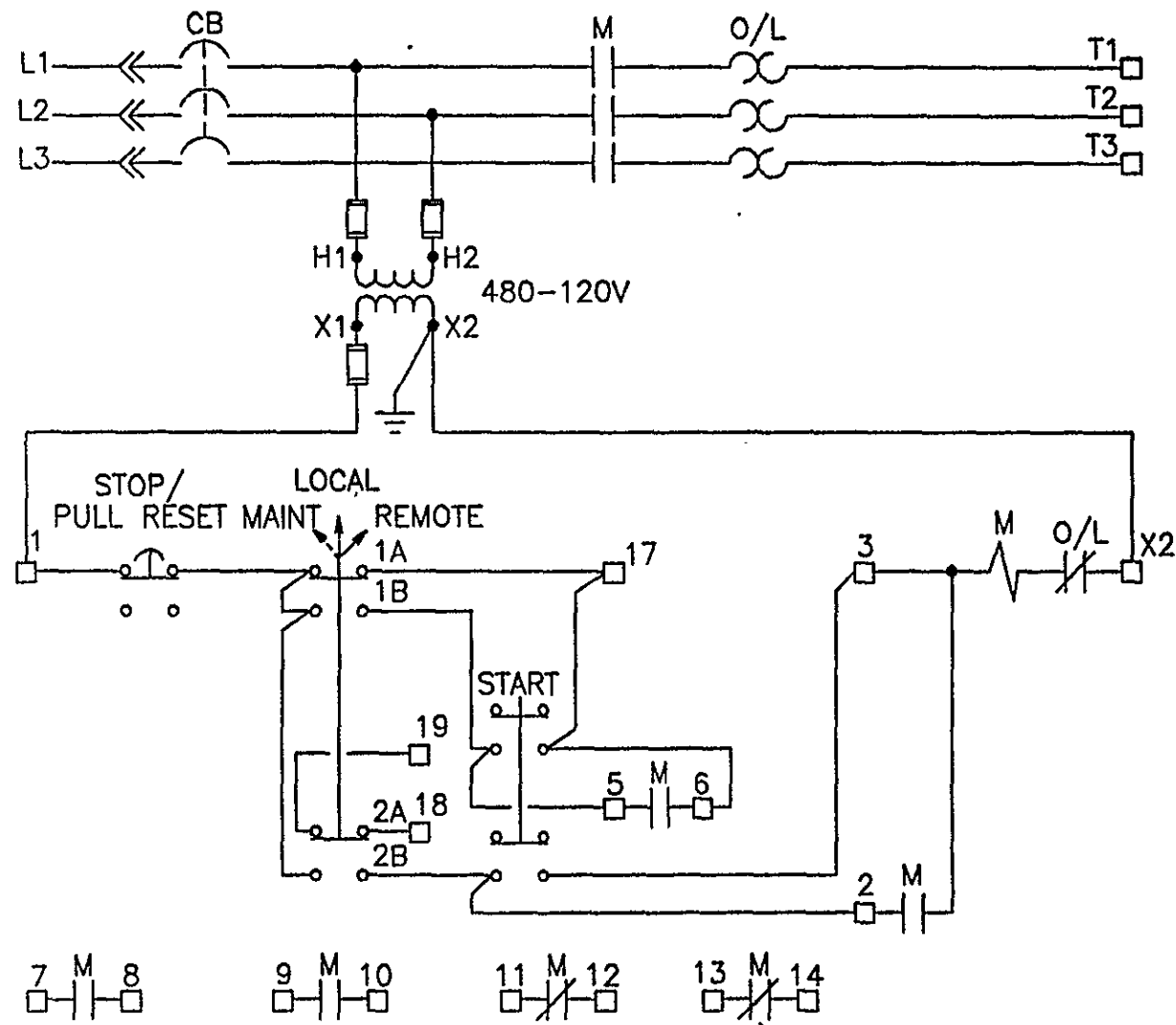
FOR SWITCH, PUSHBUTTON, AMMETER (A) AND TRANSDUCER (IT) IDENTIFICATION NO'S SEE ATTACHMENT "A".



FLUOR DANIEL DATA SHEET

U. S. Department of Energy
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838
STARTER DIAGRAM "D" FVNR, SIZE 1-4

NO.	REV.	REVISION	SHEET NO.	REV.
1			P27A-DS-2	0
2			DATE	CONTRACT
3			7-10-92	245734
4			ITEM NO.	N/A
5			SECTION	16482
6			MCC NUMBER	
7			ORIG BY	CHD
8			CCS	AT
9			APPR'D	



FOR SELECTOR SWITCH FUNCTION SEE TABLE 1, PAGE 3.

AUXILIARY CONTACTS (TYP)

□ - TERMINAL BLOCK

FOR SWITCH, PUSHBUTTON, AMMETER (A) AND TRANSDUCER (IT) IDENTIFICATION NO'S SEE ATTACHMENT "A".


**FLUOR DANIEL
DATA SHEET**

U. S. Department of Energy
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

SELECTOR SWITCH FUNCTION TABLES

NO	BY DATE	REVISION	SHEET NO. P27A-DS-2	REV. 0
△			DATE 7-10-92	CONTRACT 845734
△			ITEM NO.	N/A
△			SECTION	16482
△			MCC NUMBER	
△			ORIG BY CCS	CHK'D AT
△			APPR'D	

SELECTOR SWITCH FUNCTION			
CONTACT LOCATION	MAINT POS 1 ↙	LOCAL POS 2 ↑	REMOTE POS 3 ↗
SIDE 1 A	0	0	X
B	0	X	0
SIDE 2 A	0	0	X
B	X	0	0

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SAFETY CLASSIFICATION 3
IMPACT LEVEL 3

2025 RELEASE UNDER E.O. 14176